

REMARKS

Claims 1-9 are pending in this application, claims 1-4 and 7-9 are rejected, and claim 5-6 are withdrawn from further consideration. Claims 10-12 are added hereby.

Responsive to the rejection of claims 1-2 and 4 under 35 U.S.C. §103(a) as being unpatentable over Applicants Admitted Prior Art (APA) in view of U.S. Patent No. 5,211,896 (Ward, et al.), Applicants respectfully traverse.

APA discloses a squirrel cage rotor 20 that includes shaft 21, pipe 22 and conductor 23 having a plurality of slots 24. Heat pipes 25 are inserted into slots 24. Pipe 22 is formed of composite prepregs of polymer resin and high strength fibers. The polymer resin contains a powder having a high magnetic permeability, such as, for example, iron powder, to improve performance. Conductor 23 is made of copper or aluminum, and slots 24 are machined therein. (*page 3, lines 4-15 and Figs. 3a, 3b and 4 of the present specification*). Alternatively, cage rotor 30 (*Figs. 6 and 7*) includes conductors 38 combined with polymer resin part 32. This combined part is ground to expose the conductors along the axis of the rotor.

Ward, et al., discloses a uniform thickness of coating on iron particles is desirable since it assures more uniform dispersion of the particles throughout a core. In order to achieve this uniform coating, the iron particles are segregated into batches of small, medium and large sizes before they are coated with a polymer. Each batch is coated

separately. The coated particles are then re-mixed into any desired size distribution. Thus, the tendency for larger and smaller particles to be preferentially coated relative to the mid-size particles is avoided. (*column 5, lines 40-53*). Magnetic cores are then compression molded from the coated particles. Ideally, the polymer content is kept to a minimum to maintain physical strength. The weight of polymer is kept below from approximately 5% to below approximately 1% by weight. Compression molding requires at least 8 to 10% by weight of polymer. (*column 5, line 55 through column 6, line 8*).

In contrast, claim 1 recites in part “a polymer resin body containing powder of high magnetic permeability, wherein said powder is uniformly distributed in the polymer resin body”. (*Emphasis Added*). Applicants submit that such a structure is not disclosed or suggested by the cited references, alone or in combination, and includes distinct advantages thereover.

The Examiner rightly acknowledges that APA does not disclose or suggest that a magnetically-permeable powder is uniformly distributed in the polymer resin from which the pipe is formed. The Examiner relies on Ward, et al., for this suggestion. Applicants respectfully submit, however, that Ward, et al., does not disclose uniform distribution of magnetically-permeable powder in a polymer resin body.

Ward, et al., discloses that iron particles are first classified and segregated according to particle size, i.e., small, medium and large, and that particles within the same

size classification/category be coated in the same batch in order to avoid the preferential coating of smaller and larger particles that occurs when particles of different sizes are coated in the same batch. (*See column 5, lines 40-53*). The polymer-coated iron particles are then compression molded into a core. There is very little polymer in the body or core of Ward, et al. The amount of polymer by weight is kept below from approximately 5% to below approximately 1% by weight. (*column 5, lines 60-65*). The core of Ward, et al., is formed from iron particles that are polymer-coated, not a polymer resin body having a uniformly-distributed magnetic powder therein. Ward, et al, discloses uniformly coating iron particles and forming a core from the coated iron particles. Ward, et al., does not distribute a magnetic powder within a resin, and form a core from the powder-containing resin. Thus, Ward, et al., fails to disclose or suggest a polymer resin body containing powder of high magnetic permeability, wherein the powder is uniformly distributed in the polymer resin body, as recited in part by claim 1.

The present invention includes distinct advantages over the asserted references. The rotor of the present invention has a polymer resin part that includes a highly magnetically- permeable powder. Thus, the rotor can be of low mass relative to conventional rotors. Further, the present invention substantially prevents buckling of the conductor bars.

For the foregoing reasons, Applicants submit that claim 1, and claims 2-4 and 7-9

depending therefrom, are in condition for allowance, and respectfully request same.

Responsive to the rejection of claim 3 under 35 U.S.C. §103(a) as being unpatentable over Applicants Admitted Prior Art (APA) in view of U.S. Patent No. 5,211,896 (Ward, et al.), and further in view of U.S. Patent No. 5,122,704 (Blakeley, et al.), Applicants respectfully traverse.

Both APA and Ward, et al., are discussed above.

Blakeley, et al., discloses a machine having a stator armature 10 (*Fig. 1*) with a core 12 of ferrous material, a winding having end turns 14, a rotor/stator air gap 16, and a bearing 18 that are mounted within housing 20 that journal one end of rotor 22. (*column 3, lines 60-66*). Rotor 22 is surrounded by a containment sleeve 44 having a radially inward continuous film 46 of polyimide material. Rotor 22 is made up of laminations 60 (*Fig. 2*). Film 46 halts outward migration of coolant flow from between laminations 60. (*column 5, line 12-16*).

In contrast, claim 3 recites in part “an inner core of high magnetic permeability”. (*Emphasis Added*). Applicants submit that such a structure is not disclosed or suggested by the cited references, alone or in combination, and includes distinct advantages thereover.

As the Examiner acknowledges, neither APA or Ward, et al., disclose or suggest an inner core of high magnetic permeability, as recited in part by claim 3.

The Examiner asserts that laminations 60 of Blakeley, et al., somehow comprise an inner core of high magnetic permeability. However, Blakeley, et al., itself contradicts this assertion. Rotor 22 is constructed of laminations 60. (*column 5, lines 12-13*). The laminations are part of and form the rotor itself, not an inner core. The laminations or different layers of the rotor are not an inner core. Thus, Blakeley, et al., does not disclose or suggest an inner core of high magnetic permeability, as recited in part by claim 3.

For the foregoing reasons, Applicants submit that claim 3 and claim 4 depending therefrom are in condition for allowance, which is hereby respectfully requested.

Responsive to the rejection of claims 7-9 under 35 U.S.C. §103(a) as being anticipated over Applicants Admitted Prior Art (APA) in view of U.S. Patent No. 5,211,896 (Ward, et al.), and further in view of U.S. Patent No. 3,715,610 (Brinkman), Applicants respectfully point out that claims 7-9 depend from claim 1, which is in condition for allowance for the reasons given herein. Accordingly, claims 7-9 are also in condition for allowance, which is hereby respectfully requested.

Claim 10 has been added hereby to further protect the patentable subject matter of the present invention. Generally, claim 10 recites the subject matter of claim 1, but explicitly claims the magnetic powder distributed throughout the polymer resin body, and adds the limitation of "cooling bodies disposed within said axial slots, said cooling bodies fixedly retained within said axial slots by said polymer resin body". (*Emphasis Added*).

Support for the additional limitations of claim 10 relative to claim 1 is found at page 8, lines 17-18 of the present specification, wherein it is stated that "heat pipes 135 are fixed in slots 134 by polymer resin during the curing of the polymer resin part 132". For the same reasons given above in regard to claim 1, Applicants submit that claim 10 is also in
5 condition for allowance. Applicants further submit that the cited references do not disclose or suggest cooling bodies retained within axial slots by the polymer resin body, as recited in part by claim 10. For the foregoing reasons, claim 10 is in condition for allowance and Applicants respectfully request same.

Claim 11 has also been added hereby to further protect the patentable subject
10 matter of the present invention. Ward, et al., forms its core by compression molding iron particles coated with a polymer. In contrast, claim 11 is directed to an injection molded core. Further, claim 11 depends from claim 10, which is in condition for allowance for the reasons given above. Accordingly, claim 11 is also in condition for allowance, which is hereby respectfully requested.

15 Claim 12 has also been added hereby to further protect the patentable subject matter of the present invention. During the telephonic interview with the Examiner held on 12 November 2002, there was discussion in regard to the cited references failing to disclose or suggest an inner core disposed between a rotor and a shaft, and whether claim 3, which generally recites such a limitation, would be allowable if rewritten in

independent form to include the limitations of its base claim. Rather than rewriting claim
3, Applicants have added claim 12 which recites in part "a rotating shaft, an inner core
disposed on said shaft, said inner core having a high magnetic permeability, [and] a
polymer resin body disposed upon said inner core". (*Emphasis Added*). Applicants
5 submit that the cited references fail to disclose or suggest an inner core, and that therefore
claim 12 is in condition for allowance which is hereby respectfully requested.

For all the foregoing reasons, Applicant submits that no combination of the cited
references teaches, discloses or suggests the subject matter of the pending claims. The
claims are therefore in condition for allowance. Accordingly, Applicants respectfully
10 request withdrawal of all rejections and allowance of the claims.

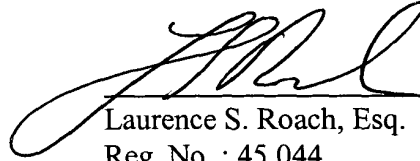
In the event Applicant has overlooked the need for an extension of time, an
additional extension of time, payment of fee, or additional payment of fee, Applicant
hereby conditionally petitions therefore and authorizes that any changes be made to
Deposit Account No. 10-0223.

The Examiner is invited to telephone the undersigned in regard to this
Amendment and the above identified application.

Respectfully submitted,

13-NOV-2002

Date


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PATENT
89799.167400 (WA-276-US)

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Applicant:	Dai Gil Lee, et al.)	
)	
Serial No.:	09/710,665)	
)	Examiner:
Filed:	November 9, 2000)	G. Perez
)	
For:	POLYMER COMPOSITE SQUIRREL CAGE)	
	ROTOR WITH HIGH MAGNETIC)	Art Unit:
	PERMEABILITY FILLER FOR INDUCTION)	2834
	MOTOR AND METHOD OF MAKING IT)	
)	

MARKED-UP COPY OF AMENDMENTS TO THE CLAIMS

Hon. Assistant Commissioner for Patents
Box: AF
Washington, D.C. 20231

Dear Sir:

In compliance with 37 CFR §1.121, Applicant hereby submits the following marked-up copy of the revisions made to the Claims by the Amendment submitted in response to the Office Action mailed June 13, 2002.

IN THE CLAIMS

Claims 5 and 6 were cancelled without prejudice.

Claims 10-12 were added, and read as follows:

10. (*New*) A composite squirrel cage rotor, comprising:

a rotating shaft;

a polymer resin body containing powder of high magnetic permeability, wherein said powder is uniformly distributed in said polymer resin body;

5 a plurality of squirrel cage conductor bars positioned around and embedded in an outer part of said polymer resin body and formed of material having high electric conductivity;

a plurality of axial slots, said axial slots are formed between said cage squirrel conductor bars; and

10 cooling bodies disposed within said axial slots, said cooling bodies fixedly retained within said axial slots by said polymer resin body, said cooling bodies dissipating heat generated in the composite squirrel cage rotor.

11. (*New*) The composite squirrel cage rotor of claim 10, wherein said polymer resin body is injection molded.

12. (*New*) A composite squirrel cage rotor, comprising:

a rotating shaft;

an inner core disposed on said shaft, said inner core having a high magnetic permeability;

5 a polymer resin body disposed upon said inner core;

a powder having a high magnetic permeability, said powder being uniformly distributed throughout said polymer resin body;

a plurality of squirrel cage conductor bars positioned axially around a periphery of said polymer resin body, said conductor bars being partially embedded in said polymer resin body,
10 said conductor bars being formed of a material having a high electric conductivity;

a plurality of axial slots, said axial slots formed between said conductor bars;

cooling bodies disposed within said axial slots, said cooling bodies fixedly retained within said axial slots by said polymer resin body, said cooling bodies dissipating heat generated in the composite squirrel cage rotor.

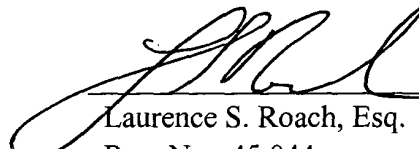
PATENT
89799.167400 (WA-276-US)

The Examiner is invited to telephone the undersigned in regard to this Amendment and
the above identified application.

Respectfully submitted,

13 - NOV - 2002

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CERTIFICATE OF MAILING BY FIRST CLASS MAIL (37 CFR 1.8)

Applicant(s): Dai Gil Lee, et al.

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November 9, 2000

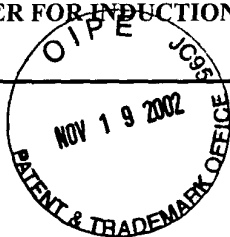
Examiner

G. Perez

Group Art Unit

2834

Invention: POLYMER COMPOSITE SQUIRREL CAGE ROTOR WITH HIGH MAGNETIC PERMEABILITY
FILLER FOR INDUCTION MOTOR AND METHOD OF MAKING IT

I hereby certify that this Marked-Up Copy of Amendments to the Claims (4 pages)

(Identify type of correspondence)

is being deposited with the United States Postal Service as first class mail in an envelope addressed to: The

Assistant Commissioner for Patents, Washington, D.C. 20231 on

November 13, 2002

(Date)

Patricia Knisley

(Typed or Printed Name of Person Mailing Correspondence)

Patricia Knisley

(Signature of Person Mailing Correspondence)

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